CLAIMS

1. A device for receiving (1; 15; 20; 30; 35; 60) a fluid sample, which is configured so as to form an electrode, in particular a counterelectrode or a working electrode, in an electrochemical cell, the device comprising an end part having at least one cavity (3; 16; 23; 39; 63) which opens to the exterior via an opening, said cavity being equipped with a base, wherein said end part exhibits a first electrically insulating hydrophobic zone (8; 17b; 25; 38; 62; 67) which is adjacent to the cavity opening and a second electrically conducting hydrophilic zone (4; 5; 19; 22; 37; 61; 66) which is adjacent to the first zone and which at least partially covers the base of the cavity such that, when said end part is immersed in said fluid and then emerges therefrom, said cavity retains part of said fluid by means of capillary action.

2. The device as claimed in claim 1, wherein the hydrophobic nature is provided by a hydrophobic coating, said hydrophobic coating being in particular deposited on said end part, at least at the periphery of said opening.

3. The device as claimed in claim 2, wherein the hydrophobic zone extends into the cavity, optionally to the base thereof, without completely covering the base, and/or extends onto an outer wall (10) of the device.

4. The device as claimed in any one of the preceding claims, wherein the hydrophilic zone is made of a metallic or nonmetallic, electrically conducting material.

5. The device as claimed in any of the preceding claims, wherein the end part comprises a body, which is made of an electrically conducting material and/or is coated with a coating of an electrically conducting material, the cavity being at least partially formed by this body.

6. The device as claimed in any one of the preceding claims, wherein the cavity has at least one of the following characteristics:
   - said cavity has a volume sufficient to retain a volume of fluid sample in the range of from 0.1 picoliter to 1 µl, and in particular from 1 to 50 nl,
   - said cavity has a depth of 5 µm to 200 µm,
   - the cavity depth/opening diameter ratio can vary in the range of from 0.01 to 1, for example from 0.1 to 1,
   - the cavity can have a circular or polygonal transverse cross section,
   - the cavity can have a substantially cylindrical or conical shape, or have a cylindrical wall extended by means of a conical base.

7. The device as claimed in any one of the preceding claims, wherein said device comprises a rod equipped, on the side of the end part, with a sleeve that has a protruding part which extends beyond the end of the rod.

8. The device as claimed in claim 7, wherein said sleeve is made of a hydrophobic material.

9. The device as claimed in claim 7, wherein said sleeve is made of a conducting material, and at least the end of the protruding part is coated with a layer of hydrophobic material, preferably electrically insulating material.

10. The device as claimed in any one of the preceding claims, wherein it comprises a damping element for reducing the impacts that may affect said device when it comes into contact via its end part with a depositing zone on a solid substrate.

11. The device as claimed in claim 10, wherein said damping element is a spring.

12. The device as claimed in any one of the preceding claims, in which said device comprises a rod.

13. The device as claimed in claim 12, wherein said rod is made of a material capable of elastic deformation.

14. The device as claimed in claim 13, wherein said rod comprises at least one part in the shape of an S which plays the role of a damping element.

15. The device as claimed in claim 11, wherein said rod slides in another part in order to damp the contact with the substrate.

16. A process for sampling and transporting a fluid sample using a device as defined in any one of the preceding claims, comprising the steps consisting in:

a) immersing the end part comprising said cavity in a container containing a fluid to be sampled, and then removing it therefrom, and

b) bringing said end part into contact with a solid substrate.

17. The process as claimed in claim 16, wherein the end part is subsequently moved away from the substrate, so as to leave, as a deposit on the substrate, a drop of fluid sample.

18. The process as claimed in claim 16 or 17, in which steps a) and b) are repeated as many times as necessary for depositing a plurality of identical or different fluid samples on the solid substrate, so as to form, on said substrate, deposits in the form of a matrix array.

19. The process as claimed in any one of claims 16 to 18, wherein the fluid sample contains biological molecules or substances to be deposited on the substrate.

20. The process as claimed in any one of claims 16 to 19, wherein said fluid contains an electrolyte and, optionally, other compounds in suspension.

21. The process as claimed in claim 20, wherein an electrochemical-type analysis of the solution or suspension sampled is carried out.

22. The process as claimed in claim 20, wherein a measurement of potential between said end part and said substrate, by means of the sample, is carried out.

23. The process as claimed in claim 20, wherein the device comprises a body made of a conducting material, and said end part is equipped with an insulating coating, and said substrate is made of a conducting material, and in which, after step b), an electric current is passed between said end part and said substrate, by means of the fluid sample.

24. The process as claimed in claim 21, wherein said fluid contains a monomer that is electropolymerizable by oxidation, and the electric current is passed between said body and

the substrate, bringing said substrate to a potential required for polymer formation.

25. A process for forming an electrochemical cell, the process comprising the following steps:
- providing a receiving device which comprises an end part having at least one cavity which opens to the exterior via an opening, said cavity being equipped with a base, this end part exhibiting a first electrically insulating hydrophobic zone which is adjacent to the cavity opening and a second electrically conducting hydrophilic zone which is adjacent to the first zone and which at least partially covers the base of the cavity,
- providing a receiving surface, in particular a substrate, having at least one conducting zone,
- sampling a fluid sample by means of the receiving device,
- bringing the end part of the receiving device into contact with the conducting zone of the receiving surface, the first hydrophobic zone being configured so as to electrically insulate the second conducting hydrophilic zone from the conducting zone of the receiving surface.

26. A process comprising the following steps:
- providing a receiving device which comprises an end part having at least one cavity which opens to the exterior via an opening, said cavity being equipped with a base, this end part exhibiting a first electrically insulating hydrophobic zone which is adjacent to the cavity opening and a second electrically conducting hydrophilic zone which is adjacent to the first zone and which at least partially covers the base of the cavity,
- providing a receiving surface, in particular a substrate, having at least one conducting zone,

- sampling a fluid sample by means of the receiving device,
- bringing the end part of the receiving device into contact with the conducting zone of the receiving surface, the first hydrophobic zone being configured so as to electrically insulate the second conducting hydrophilic zone from the conducting zone of the receiving surface,
- establishing an electric current between the hydrophilic zone of the receiving device and the conducting zone of the substrate or measuring an electrical parameter, for example a potential difference, between the conducting zone of the receiving device and the conducting zone of the receiving support.

27. The process as claimed in claim 26, comprising the following step:
- establishing an electric current, in particular a pulsed current, between the hydrophilic zone of the receiving device and the conducting zone of the substrate in order to polymerize a substance contained in the cavity of the receiving device.

28. The process as claimed in claim 26, comprising the following steps:
- measuring an electrical parameter, in particular a potential difference, between the conducting zone of the receiving device and the conducting surface, for example a steel sheet,
- repeating the preceding step in order to carry out, for the conducting surface, a mapping relating to a physical or chemical characteristic, for example an oxidation state, using the measurements obtained.